UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/518,825	12/21/2004	Peter Klaus Bachmann	DE020166US	3595

24737 7590 12/01/2009
PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
WOLDEKIDAN, HIBRET ASNAKE	

ART UNIT	PAPER NUMBER
2613	

MAIL DATE	DELIVERY MODE
12/01/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/518,825	BACHMANN ET AL.
	Examiner	Art Unit
	Hibret A. Woldekidan	2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 July 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Response to Arguments

1. Examiner acknowledges receipt of Applicant's Amendments, remarks, arguments received on 7/15/2009. Applicant's arguments have been fully considered but are moot in view of the new grounds of rejection.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1, 5,10-17,22,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of Su et al. (US 2006/0019247).

Considering claim 1 Brennan discloses electromagnetic radiation with a variable intensity**(See abstract page 56, Section 1.4 Page 57, fig. 2 i.e. fig. 2 illustrates that electromagnetic radiation with variable intensity)**, an optical component**(See Section 1.1 page 56, i.e. carbon nanotube is an optical component)**, the optical component comprising at least one photoluminescent carbon nanotube configured to emit light at wavelengths varying non-linearly with the intensity of said light **(See**

Section 1.4, page 57, fig. 2 i.e. the optical component is photoluminescence carbon nanotube that has a non linearly varying intensity), and an optical detector of optical electromagnetic radiation**(See abstract, page 57 paragraph 5 i.e. absorbance of nonlinear photoluminescence in carbon nanotubes)** ,

Brennan does not explicitly disclose wherein the source of electromagnetic radiation, the at least one photoluminescent carbon nanotube and the detector are together configured to perform an optical signal processing operation of the optical signal processing device.

Su teaches a source of electromagnetic radiation**(See Paragraph 21, fig. 2 i.e. the light source(210) is a laser that emits electromagnetic radiation)**, the at least one photoluminescent carbon nanotube**(See Paragraph 12,31, fig. 2 i.e. nano pore(255) which is carbon nanotube)** integrated with an optical detector are together configured to perform an optical signal processing operation of the optical signal processing device**(See Paragraph 13,36,48, fig. 2 i.e. a photodetector(257) and the carbon nano tubes(255) are integrated together in the system(200) to perform optical signal processing by receiving optical signal from the light source(210))**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen, and have a source of electromagnetic radiation, at least one photoluminescent carbon nanotube and a detector to be configured together to perform an optical signal processing operation of the optical signal processing device, as taught by Su, thus providing an efficient signal

processing device by using a sensing device which is capable of sensing and passing the signal to a computer for further processing, as discussed by Su **(See paragraph 4)**.

Considering claim 5 Brennen discloses an optical signal processing component having at least one photoluminescent carbon nanotube having wavelengths varying non-linearly with the intensity of said light **(See abstract, page 57section 1.5, Page 59 section 3.1, fig. 2 i.e. non linear variation of wavelength versus intensity of photoluminescence carbon nanotubes),** wherein the at least one photoluminescent carbon nanotube for processing signals **(See abstract, Section 1.1 page 56, page 57 paragraph 5) the photoluminescence carbon nanotube for processing optical signals)**.

Brennen does not explicitly show an optical signal processing device equipped with a source of electromagnetic radiation and an optical detector configured to detect the emitted light**(Paragraph 21, fig. 2 i.e. an optical signal processing device of fig. 6 has a light source(64) for generating electromagnetic radiation and a radiation energy(14) detected by the optical detection system(60))**.

Su teaches an optical signal processing device equipped with a source of electromagnetic radiation and an optical detector configured to detect the emitted light **(Paragraph 21, fig. 2 i.e. an optical signal processing device(200) has a light source(210) which is a laser for generating electromagnetic radiation and an photodetecor(257) for detecting the optical signal)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen, and have an optical signal

processing device to be equipped with a source of electromagnetic radiation and an optical detector to be configured to detect the emitted light, as taught by Su, as taught by Su, thus providing an efficient signal processing device by using a sensing device which is capable of sensing and passing the signal to a computer for further processing, as discussed by Su **(See paragraph 4)**.

Considering Claim 10, Brennen discloses the optical signal processing component of claim 5, wherein the at least one photoluminescent carbon nanotube emits light at wavelengths over the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 2 i.e. fig. 2 illustrates that photoluminescent carbon nanotube emitting light over the wavelength range of 600-700 nm)**.

Considering Claim 11, Brennen discloses the optical signal processing component of claim 10, wherein the wavelength varying non-linearly with the intensity of said light reaches a highest maximum at a wavelength in the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 1 i.e. fig. 1 illustrates that photoluminescent carbon nanotube reaches a maximum intensity over the range of wavelength range of 600-800 nm)**.

Considering Claim 12, Brennen discloses the optical signal processing component of claim 11, wherein the wavelength varying non-linearly with the intensity of said light reaches the highest maximum at a wavelength in the range from 660 to 690 nm **(See Page 59 section 3.1, Paragraph 2, fig. 2 i.e. the intensity or energy of the emitted light reaches a maximum or peak at 660 nm)**.

Considering Claim 13, Brennen discloses the optical signal processing device of claim 1, wherein the at least one photoluminescent carbon nanotube emits light at wavelengths over the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 2 i.e. fig. 2 illustrates photoluminescent carbon nanotube emits light at wavelengths over the range of wavelength range of 600-700 nm)**.

Considering Claim 14, Brennen discloses the optical signal processing device of claim 13, wherein the wavelength varying non-linearly with the intensity of said light reaches a highest maximum at a wavelength in the range from 600 to 700 nm **(See Page 59 section 3.1, fig. 2 i.e. fig. 2 illustrates that the wavelength vary non linearly with the intensity and the photoluminescent carbon nanotube the intensity reaches a maximum over the range of wavelength range of 600-700 nm)**.

Considering Claim 15, Brennen discloses the optical signal processing device of claim 14, wherein the wavelength varying non-linearly with the intensity of said light reaches a maximum at a wavelength in the range from 600 to 690 nm **(See Page 59 section 3.1, Paragraph 2 , fig. 2 i.e. the intensity or energy of the emitted light reaches a maximum or peak at 660 nm which is at a wavelength range of 600-700 nm)**.

Considering Claim 16, Brennen teaches an optical device comprising at least one photoluminescent carbon nanotube configured to emit, in response to an input of electromagnetic radiation, light over a range that includes wavelengths from 600 to 700 nm **(See Page 59 section 3.1, fig. 2 i.e. fig. 2 illustrates that the photoluminescent carbon nanotube emits light over the range 600-700 nm.)**, wherein an intensity of

emitted light reaches a highest maximum at a wavelength greater than or equal to 600 nm and less than or equal to 700 nm**(See Page 59 section 3.1, Paragraph 2 , fig. 2 i.e. the intensity or energy of the emitted light reaches a maximum or peak at 660 nm which is at a wavelength range of 600-700 nm)**.

Brennen does not explicitly disclose an optical device comprising at least one photoluminescent carbon nanotube comprising a first side and a second side, wherein in response to an input of electromagnetic radiation on the first side, signal is emitted from the second side .

Su teaches an optical device(200) comprising at least one photoluminescent carbon nanotube(255) comprising a first side and a second side, wherein in response to an input of electromagnetic radiation on the first side, signal is emitted from the second side **(See Paragraph 21,35,36, fig. 2 i.e. a carbon nanotube receiving electromagnetic radiation generated from the light source(210) on the left side and passing the light source to the photodetector(257) located on the right side of the carbon nano tube)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen, and have a photoluminescent carbon nanotube comprising a first side and a second side, wherein in response to an input of electromagnetic radiation on the first side, light is emitted from the second side, as taught by Su, thus providing an efficient signal processing device by

using a sensing device which is capable of sensing and passing the signal to a computer for further processing, as discussed by Su **(See paragraph 4)**.

Considering Claim 17, Brennen teaches the optical device of Claim 16 wherein the wavelengths vary non-linearly with intensity of the electromagnetic radiation **(See page 57section 1.5, Page 59 section 3.1, fig. 2 i.e. fig. 2 illustrates that the photoluminescent carbon nanotube intensity vary non-linearly with the intensity of the electromagnetic radiation)**.

Considering Claim 22 Su teaches the optical signal processing device of claim 1, wherein the optical signal processing operation comprises one of an optical switching operation, an optical amplification operation, an optical limiting operation and an optical logical operation**(See Paragraph 38, fig. 3 i.e. Performing amplification using amplifier(270), performing switching using mems(See paragraph 38), perform a logic operation using a computer(265))**.

Considering Claim 23 Su teaches the optical signal processing component of claim 5, wherein the optical signal processing operation comprises one of an optical switching operation, an optical amplification operation, an optical limiting operation and an optical logical operation**((See Paragraph 38, fig. 3 i.e. Performing amplification using amplifier(270), performing switching using mems(See paragraph 38), perform a logic operation using a computer(265))**.

1. Claims 2,3 are rejected under 35 U.S.C. 103(a) as being unpatentable over BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. “Submitted on IDS by the

applicant" in view of in view of Su et al. (US 2006/0019247) further in view of Frankel (6,096,496).

Considering claim 2 Brennan and Su disclose the optical signal processing device of claim 1, wherein the optical component comprises a substrate**(See Su: fig. 2 i.e. optical signal processing devise(200) having a layer of photo-active elements which is photon sensing layer(220))**

Brennan and Su do not explicitly disclose the optical signal processing device of claim 1, wherein the optical component comprises a substrate and a layer having a number of photoluminescent structure

Frankel teaches an optical component comprises a substrate and a layer having a number of photoluminescent structure **(See Col. 17 line 53-67, Col. 26 line 7-28 i.e. a Laser comprising a substrate and a photoluminescent emitting structure)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennan and Su, and have an optical component to comprise a substrate and a layer having a number of photoluminescent structure, as taught by Frankel, thus providing a device that transmits by distinctly emitting a variable intensity of light, as discussed by Frankel **(See Col. 5 lines 35-38)**.

Considering claim 3, Frankel teaches the optical signal processing device of claim 2, wherein the non-linear optical component further comprises an intermediate layer between the substrate and the layer having a number of photoluminescent structure **(See Col. 26 line 7-27 and line 44-55, Fig. 15, Fig 16 i.e. a wave guide between the substrate and a layer having a photoluminescent structure)**.

2. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of in view of Su et al. (US 2006/0019247) further in view of Dutton.

Considering Claim 4, BRENNAN and Su disclose a light source providing optical signal to the detection system to perform optical processing **(See Paragraph 28, fig. 6 i.e. in a signal processing system of fig. 6, a light source(64) providing g radiation to the detection system)**

BRENNAN and Su do not explicitly disclose an optical signal processing device of claim 1, wherein the electromagnetic radiation is monochromatic coherent laser light.

Dutton teaches a monochromatic coherent laser light source for providing electromagnetic radiation to the photo detector(310) to perform optical signal processing**(See Col. 3 lines 43-45,fig. 1 i.e. a monochromatic coherent laser light source(100) providing optical light to the photo detecting system(310)).**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of BRENNAN and Su, and have a monochromatic coherent laser light source for providing coherent light to the detection system to perform optical signal processing, as taught by Dutton, thus providing an efficient signal processing system and improve the quality of the detected signal by minimizing noise from the detected signal using a coherent light source, as discussed by Dutton **(Col. 3 lines 45-47)**.

3. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of Su et al. (US 2006/0019247) further in view of Lieber (7,129,554).

Considering claim 6, Brennen and Su do not specifically disclose the optical signal processing component of claim 5, wherein the carbon nanotube has a thin film coating.

Lieber teaches the optical component of claim 5, wherein the carbon nanotube has a thin film coating **(See Col. 5 lines 54-57 i.e. the carbon nanotube has a thin film coating)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen and Su, and modify the carbon nanotube to have a thin film coating, as taught by Lieber, thus providing efficient transport of charge carrier and excitations, as discussed by Lieber **(Col. 1 lines 21-25)**.

Considering claim 7, Lieber teaches the optical signal processing component of claim 5, wherein the carbon nanotube is embedded in a non-oxidizing matrix **(See Col. 11 line 6-38 i.e. buffer gas as a non-oxidizing matrix)**.

Considering claim 8, Lieber teaches the optical signal processing component of claim 5, wherein the carbon nanotube is embedded in a non-oxidizing matrix, which is transparent for electromagnetic radiation **(See Col. 16 line 15-20, Col. 25 line 38-43, Col. 11 line 6-38 i.e. glass which is non-oxidizing and transparent material).**

Considering claim 9, Lieber teaches the optical component signal processing of claim 5, wherein the carbon nanotube is embedded in a non-oxidizing, flexible matrix **(See Col. 16 line 15-20, Col. 25 line 38-43, Col. 11 line 6-38 i.e. glass which is non-oxidizing and transparent material i.e. buffer gas as a non-oxidizing matrix)**.

4. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brennan ME et al.; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of in view of Su et al. (US 2006/0019247) further in view of Bogner et al. (6,649,946).

Claim 18 Brennen and Su do not specifically disclose the optical device of Claim 16 wherein the intensity of emitted light only decreases after the highest maximum intensity.

Bogner teaches the optical device of Claim 16 wherein the intensity of emitted light only decreases after the highest maximum intensity **(See fig. 5, Col. 4 lines 13-17, i.e. illustrates that the maximum intensity reaches between 600 and 700 nm and the intensity of emitted light decreases only after it reaches a maximum)**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen and Su, and have the intensity of emitted light only decreases after the maximum intensity, as taught by Bogner, thus providing a stabilized light emitting device that operates in high temperature for emitting a high color radiation, as discussed by Bogner **(Col. 2 lines 10-15)**.

5. Claims 19,20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brennan ME et al.; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes;

vol. 4461 ; pages 56-64; August 2001; USA. “Submitted on IDS by the applicant” in view of in view of Su et al. (US 2006/0019247) further in view of Lee et al. (6,514,113).

Considering Claim 19, Brennen and Su disclose a photoluminescent carbon nanotube**(See Brennen: abstract).**

Brennen and Su do not explicitly show the optical device of claim 16, wherein the at least one photoluminescent carbon nanotube is comprised in a component including a substrate and a layer on the substrate comprising the at least one photoluminescent carbon nanotube.

Lee teaches the optical device of claim 16, wherein the at least one photoluminescent carbon nanotube is comprised in a component including a substrate and a layer on the substrate comprising the at least one photoluminescent carbon nanotube **(See Col. 4 line 20-35, Fig. 1 i.e. fig. 1 illustrates that carbon nanotubes comprised in a component including a substrate (element 100) comprising a number of carbon nanotubes (element 400))**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen and Su, and have the photoluminescent carbon nanotube to be comprised in a component including a substrate and a layer on the substrate comprising the at least one photoluminescent carbon nanotube, as taught by Lee, thus providing a means of producing an efficient light source, as discussed by Lee **(See Col. 1 lines 32-35)**.

Considering Claim 20, Lee teaches the optical device of claim 19, wherein the component further comprises an intermediate layer between the substrate and the layer

comprising the at least one photoluminescent carbon nanotube **(See Col. 4 line 4-35, Fig. 1 i.e. fig. 1 illustrates that an intermediate layer(element 200,300) between the substrate(element 100) and carbon nano-tubes (element 400))**.

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over BRENNAN ME. ET.AL; Nonlinear Photoluminescence from Multiwalled Carbon Nanotubes; vol. 4461 ; pages 56-64; August 2001; USA. "Submitted on IDS by the applicant" in view of in view of Su et al. (US 2006/0019247) further in view of Dutton(5753930).

Considering Claim 21 Brennen and Su do not explicitly disclose the optical device of claim 16, wherein the electromagnetic radiation is monochromatic coherent laser light

Dutton teaches a monochromatic coherent laser light source for providing electromagnetic radiation to the photo detector(310) to perform optical signal processing**(See Col. 3 lines 43-45,fig. 1 i.e. a monochromatic coherent laser light source(100) providing optical light to the photo detecting system(310)).**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Brennen and Su, and have a monochromatic coherent laser light source for providing coherent light to the detection system to perform optical signal processing, as taught by Dutton, thus providing an efficient signal processing system by minimizing noise from the detected signal using a coherent light source and improve the quality of the detected signal, as discussed by Dutton **(Col. 3 lines 45-47)**.

Conclusions

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hibret A. Woldekidan whose telephone number is (571)270-5145. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Vanderpuye can be reached on 5712723078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H. A. W./
Examiner, Art Unit 2613

/Kenneth N Vanderpuye/
Supervisory Patent Examiner, Art Unit 2613